

Amendments to the Claims

The following listing of claims replaces all prior versions, and listings, of claims in this application.

- 1 1. (Currently Amended) An apparatus for use in a system for supercritical processing of an
2 object with a fluid, comprising:
3 means for injecting a processing chemistry into the system for supercritical
4 processing, including means for starting and means for stopping the means for injecting;
5 and
6 means for substantially preventing fluid from re-entering the means for injecting
7 during supercritical processing.
- 1 2. (Original) The apparatus of claim 1 wherein the means for injecting comprises means for
2 injecting at a predetermined pressure.
- 1 3. (Original) The apparatus of claim 2 wherein the predetermined pressure is in a range of
2 approximately 2300 psi to approximately 3000 psi.
- 1 4. (Original) The apparatus of claim 2 wherein the means for injecting further comprises at
2 least one of a pump, a first backflow-prevention means for substantially preventing
3 backflow of the processing chemistry, and a second backflow-prevention means for
4 substantially preventing backflow of the processing chemistry.
- 1 5. (Original) The apparatus of claim 4 wherein at least one of the first backflow-prevention
2 means and the second backflow-prevention means comprises at least one check valve.
- 1 6. (Original) The apparatus of claim 1 wherein at least one of the means for starting and the
2 means for stopping comprises a flow-control means.
- 1 7. (Original) The apparatus of claim 6 wherein the flow-control means comprises at least
2 one of a valve, a pneumatic actuator, an electric actuator, a hydraulic actuator, and a
3 micro-electric actuator.

- 1 8. (Original) The apparatus of claim 1 wherein the means for substantially preventing fluid
2 from re-entering the means for injecting is operative when at least one of the means for
3 stopping is active and the means for starting is active.
- 1 9. (Original) The apparatus of claim 8 wherein the means for substantially preventing fluid
2 from re-entering the means for injecting comprises a back-pressure regulator.
- 1 10. (Original) The apparatus of claim 1 wherein the object is a semiconductor wafer for
2 forming integrated circuits.
- 1 11. (Original) The apparatus of claim 1 further comprising a fluid source in fluid flow
2 communication with the means for injecting.
- 1 12. (Original) The apparatus of claim 1 further comprising a fluid supply means for
2 supplying the processing chemistry to the means for injecting.
- 1 13. (Original) The apparatus of claim 12 wherein the processing chemistry is at least one of
2 gaseous, liquid, supercritical and near-supercritical carbon dioxide.
- 1 14. (Original) The apparatus of claim 13 wherein at least one of solvents, co-solvents and
2 surfactants are contained in the carbon dioxide.
- 1 15. (Original) The apparatus of claim 12 wherein the fluid supply means comprises at least
2 one of a fluid mixer, a first fluid source, a valve for controlling a flow of a first fluid from
3 the first fluid source, a second fluid source, and a valve for controlling a flow of a second
4 fluid from the second fluid source.
- 1 16. (Currently Amended) A system for supercritical processing of an object with a fluid,
2 comprising:
3 a high-pressure process chamber;
4 means for injecting a processing chemistry into the high-pressure process chamber
5 including means for starting and means for stopping the means for injecting; and
6 means for substantially preventing fluid from re-entering the means for injecting
7 during supercritical processing.

- 1 17. (Original) The system of claim 16 wherein the means for injecting comprises means for
2 injecting at a predetermined pressure.
- 1 18. (Original) The system of claim 17 wherein the predetermined pressure is in a range of
2 approximately 2300 psi to approximately 3000 psi.
- 1 19. (Original) The system of claim 16 wherein the means for injecting includes at least one of
2 a pump, a first backflow-prevention means for substantially preventing backflow of the
3 processing chemistry, and a second backflow-prevention means for substantially
4 preventing backflow of the processing chemistry.
- 1 20. (Original) The system of claim 19 wherein at least one of the first backflow-prevention
2 means and the second backflow-prevention means comprises at least one check valve.
- 1 21. (Original) The system of claim 16 wherein at least one of the means for starting and
2 means for stopping comprises a flow-control means.
- 1 22. (Original) The system of claim 21 wherein the flow-control means comprises at least one
2 of a valve, a pneumatic actuator, an electric actuator, a hydraulic actuator, and a micro-
3 electric actuator.
- 1 23. (Original) The system of claim 16 wherein the means for substantially preventing fluid
2 from re-entering the means for injecting is operative when at least one of the means for
3 stopping is active and the means for starting is active.
- 1 24. (Original) The system of claim 23 wherein the means for substantially preventing fluid
2 from re-entering the means for injecting comprises a back-pressure regulator.
- 1 25. (Original) The system of claim 16 further comprising means for circulating a fluid,
2 wherein the means for circulating a fluid is coupled to the high-pressure process chamber.
- 1 26. (Original) The system of claim 16 further comprising a process control computer coupled
2 for controlling at least one of a valve, a pneumatic actuator, an electric actuator, a
3 hydraulic actuator, a micro-electric actuator, a pump, and a back-pressure regulator.

- 1 27. (Original) The system of claim 16 wherein the object is a semiconductor wafer for
2 forming integrated circuits.
- 1 28. (Original) The system of claim 16 wherein the processing chemistry is at least one of
2 gaseous, liquid, supercritical and near-supercritical carbon dioxide.
- 1 29. (Original) The system of claim 28 wherein at least one of solvents, co-solvents and
2 surfactants are contained in the carbon dioxide.
- 1 30. (Original) A supercritical processing system for processing a semiconductor wafer with a
2 fluid, the fluid being from a fluid source, the system comprising:
3 a. a circulation loop coupled to a high-pressure processing chamber; and
4 b. an inlet line for introducing the fluid into the circulation loop, the inlet line
5 including:
6 i. an inlet port in the circulation loop;
7 ii. a back-pressure regulator coupled to the inlet port;
8 iii. a pump for compressing the fluid to form a pressurized fluid;
9 iv. a first line for transferring the pressurized fluid from the pump to the back-
10 pressure regulator, the first line configured to maintain a uni-directional
11 flow of the pressurized fluid from the pump towards the back-pressure
12 regulator; and
13 v. a second line for transferring a quantity of the fluid from the fluid source
14 to the pump, the second line configured to maintain a uni-directional flow
15 of the fluid from the fluid source to the pump.
- 1 31. (Withdrawn) A method of regulating a flow of a processing chemistry into a system for
2 supercritical processing of an object with a fluid, comprising the steps of:
3 a. supplying the processing chemistry to a pump for compressing the processing
4 chemistry to form a pressurized fluid;
5 b. providing a start-stop system for controlling an inlet line for introducing the
6 processing chemistry into the system, such that when a start mode is active the
7 pressurized fluid is introduced into the system, and such that when a stop mode is
8 active the pressurized fluid is not introduced into the system;
9 c. maintaining a flow of the pressurized fluid when the start mode is active; and

10 d. preventing a fluid within the system from entering the inlet line while at least one
11 of the start mode and the stop mode is active.

1 32. (Withdrawn) The method of claim 31 wherein the step of maintaining a flow of the
2 pressurized fluid comprises operating the pump such that a predetermined quantity of the
3 processing chemistry is introduced into the system.

1 33. (Withdrawn) The method of claim 32 wherein the predetermined quantity of the
2 processing chemistry is introduced into the system at a predetermined pressure.

1 34. (Withdrawn) The method of claim 33 wherein the predetermined pressure is in a range of
2 approximately 2300 psi to approximately 3000 psi.

1 35. (Withdrawn) The method of claim 31 wherein the step of preventing a fluid within the
2 system from entering the inlet line comprises providing a back-pressure regulator.

1 36. (Withdrawn) The method of claim 31 wherein the object is a semiconductor wafer for
2 forming integrated circuits.

1 37. (Withdrawn) The method claim 31 wherein the processing chemistry is at least one of
2 gaseous, liquid, supercritical and near-supercritical carbon dioxide.

1 38. (Withdrawn) The method claim 33 wherein at least one of solvents, co-solvents and
2 surfactants are contained in the carbon dioxide.

1 39. (Withdrawn) The method claim 31 further comprising performing at least one of a
2 supercritical cleaning process and a supercritical rinsing process.